SCIENCE

FRIDAY, AUGUST 26, 1887.

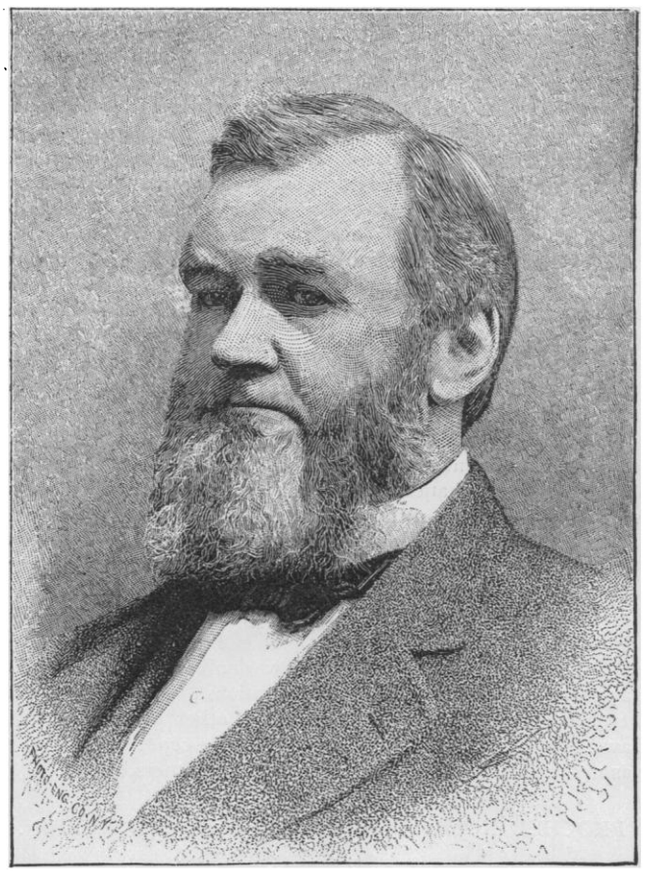
A FEW WEEKS AGO Stanley's death was announced by a cable despatch from St. Thomé. A missionary at Matadi was said to have received the news from a negro who had come from the upper Kongo. A few days ago the French government received a telegram to the same effect from Zanzibar. Both these reports are utterly unreliable. The last letters from Stanley were dated from Aruwimi Falls, June 18. He informed his friends of his safe arrival there, and says that the natives report numerous falls and rapids farther up the river. Therefore he was about to begin his land journey to the Mvutan Nsige. No later news has been received at

ALVAN CLARK.

the mouth of the Kongo, and the arrival at Zanzibar of letters or news from his expedition at this date is out of the question, as the distance is very great and part of the route difficult. It is probable that at the present time Stanley is very near Emin Pacha, or has met him. The messengers who were sent from Zanzibar to inform Emin of Stanley's expedition were detained some time by Mwanga, and only recently reached Unyoro. Here they learned that Emin had crossed the Mvutan Nsige, and gone up the river which probably connects the Muta and Mvutan Nsige. They were unable to see him, and therefore were expecting his return. From these reports it appears that Emin never intended to make his way through Uganda, as was said some time ago. News from Central Africa reaches us now with such wonderful speed that we may expect to hear soon of the meeting of Emin and Stanley on the shore of the Mvutan Nsige. Emin's latest letters show that the condition of his province has greatly improved, and that at the present time peace prevails on the banks of the upper Nile; but he says that the negro tribes are at the present time much more powerful than they were before the war, as they have obtained numerous guns. Therefore Stanley's help will be very welcome, and probably enable him to carry on the work of civilization which he has so successfully begun.

TWO LOSSES TO SCIENCE.

THIS week we have to chronicle the deaths of two leading American scientific men. Spencer F. Baird, born at Reading, Penn., Feb. 3, 1823, died at Wood's Holl on Aug. 22. Alvan Clark died the same day at his home in Cambridge, at the age of eighty-three, having been born, at Ashfield, Mass., March 8, 1804. We have already told, in *Science*, of Baird's life. He was from youth interested in natural history, and so devoted his time and energies that he was early an honored companion of the best. His executive powers finally led to his being singled out as a fit head for first one and then another of the rapidly growing government scientific organizations, and it is for his good conduct of these affairs that we now best know him, and for which he received the sincere respect of the public. Of Clark it might be said that we came near losing him. He was forty before he began his life-work which made him famous. His oldest son, as many a boy has before and since, wished a telescope, and, per force of circumstances, must make it.



SPENCER F. BAIRD.

He asked his father's help in grinding and polishing the piece of speculum metal he had obtained for his reflector. The father had never seen a mirror or lens ground and polished. But, as he once said, "a father tries pretty hard when a child asks for help;" and this father did try, so that now the renown of his achievements as a maker of lenses is world-wide.

Mr. Clark had been in his usual good health up to a fortnight ago, when he complained of illness, and though no disease of an organic nature appeared, he gradually failed, and death resulted from old age. He was essentially a New England man. He labored on the farm until he reached his twenty-second year, and then, having by

his own endeavors acquired considerable skill at painting, secured a position as a calico engraver at Lowell. Here he married Miss Maria Pease, and last year they celebrated the sixtieth anniversary of their wedding. From 1826 to 1835 he was employed at the Merrimac works at Lowell, designing patterns, a part of that time being employed at other establishments of a similar character.

During all that period he kept up his practice as a painter, he being an enthusiast in that direction. In 1835 he discontinued his business as a calico designer and engraver, and moved to Boston and established a studio on Tremont Street, selecting Cambridge as a place of residence, his home being on Prospect Street. His pictures of the late Dr. Hare of Philadelphia and that of Dr. Hill of Cambridge are specimens of his skill and taste. At the house on Brookline Street there are a number of specimens of his art, among which are the faces of Daniel Webster, Constable Clapp, renowned in his day as a skilful detector of crimes, and of a son who died when a youth, painted from memory. During this time sons and daughters were born to him, George B. in 1827 and Alvan G. in 1832, both of whom are living.

He began with his sons in 1846 the manufacture of telescopes. The younger son, Alvan G., at first entered into other business, but finally settled down to that of telescope making, and all three, under the name and style of Clark & Sons, have worked together for nearly forty years.

In 1850 Mr. Alvan Clark went to Europe and spent a great deal of his time with Mr. W. R. Dawes, the English astronomer, and while in his observatory discovered a new star, now known as companion to '99 Hercules.' Mr. Clark afterward had an extensive correspondence with Mr. Dawes, and spoke of his connection with him as the closest friendship of his life. Soon after his return from Europe in 1860 he received the first order for a large telescope in this country from the University of Mississippi, the glass being 18½ inches, three inches larger than any that had been hitherto successfully used in the world. The war prevented its sale to the southern college, and it was finally purchased by the University of Chicago. Then followed the construction of two glasses of twenty-six inches each, one being disposed of to the University of Virginia and the other placed in the observatory at Washington. Their reputation rapidly spread through Europe, and orders came faster than they could be filled. The number of instruments they have made is very large. The cheapest one cost $300, while the national telescope was sold for $46,000, and the cost of the Lick glass was set at $50,000 without the mounting.

This was the work of a man who never had seen a lens in process of construction in the hands of any one out of his own shop. Mr. Clark was emphatically a self-made man. His only education was what he received in the public schools of western Massachusetts. His reputation was patiently, steadily, and justly earned, His extraordinary power seemed to be acuteness of the eye, of the touch, and of the understanding, combined with unlimited patience. Not long since he said: "I owe largely my recognition by the scientific world to Mr. Dawes. I had, as I thought, with one of my telescopes discovered several new double stars. I wrote to Dawes, asking him to verify my observations. He answered that they were real discoveries. I reported other discoveries. Mr. Dawes wrote: 'Where did you get your telescope?' 'I made it,' was my reply. I sold him that glass and five others."

PROCEEDINGS OF THE AMERICAN ASSOCIATION.

Section C.

THE address of Vice-President Prescott was on the chemistry of nitrogen as disclosed in the constitution of the alkaloids. He said, "The character of nitrogen is a challenge to chemical skill. Mocking us by its abundance in its free state, the compounds of this element are so sparingly obtained that they set the rate of value in supplies for the nourishment of life, — the agent chosen and trusted for projectile force in arts of war and of peace, — yet the manufacture of its most simple and stable compound has been a vain attempt, and it is one urged anew by the chemical industries. Moreover, nitrogen holds the structure of the aniline dyes, and governs the constitution of the vegetable alkaloids. In research the nearest approaches to the molecule as a chemical centre have been reached through organic chemistry. Carbon was the first and hydrogen has been the second element to give to organic chemistry a definition. At present, carbon is looked upon as the member for fixed position, and hydrogen as the member for exchange, in organic families. Nitrogen comes next in turn to receive attention. The study of the carbonaceous compounds of nitrogen promises to do for organic chemistry what the latter has done for general science."

The speaker then outlined the history and present state of the structural chemistry of the vegetable alkaloids, as follows: "1. Nitrogenous bases as derivatives of ammonia. 2. Nitrogenous bases represented by aniline. 3. The pyridine type in the vegetable alkaloids. The constitution of the pyridine and quinoline series was ascertained by Koerner and by Baeyer in 1870. These bodies can be obtained from bone-oil and from coal-tar. They are of a remarkable chemical structure. Like aniline, they have the closed chain of six positions, but, unlike aniline, they have one of these positions held by nitrogen. The introduction of the atom of nitrogen into the closed ring so affects the qualities of the molecule that stable addition-products are formed. About 1879 it began to appear that the vegetable alkaloids in general are of the pyridine type, of 'aromatic' composition. In this type the structure of ammonia is not violated; and the theories of Liebig, Wurtz, and Hofmann are not superseded. Within the last three or four years the veil has been drawn from the structure of the chief alkaloids of plants. Even before that, the alkaloids of black pepper, tobacco, and hemlock, of very simple composition, were studied with success. The alkaloids of the belladonna-root, the cinchona-bark, and the coca-leaf, are now subject to an increasing measure of constructive operation in the laboratory. Morphine is convertible into codeine, and the efforts to convert strychnine into brucine, and cinchonine into quinine, ought to succeed. The necessary studies of position in the pyridine molecule are being entered upon. Some good medicinal alkaloids are being made by art. It may come that the identical alkaloids of nature will be made by art. Not by chance efforts, however, nor by premature short-cuts, but, if at all, through the well-earned progress of the world's chemistry, will these results be gained. And it speaks enough for the rate of this progress to say that one of the very first of the forward steps here recounted was taken by a man still living as a contributor. Due honor for what his hands have done, and all gratitude for what his eyes have seen."

Thirty-five papers and two committee reports were presented to the section. The papers may be classified as follows: — *Analytical Chemistry*, on a new apparatus for fractional distillation, by T. H. Norton; on the improvement in stand for electrolysis, by W. H. Herrick; on a process for separation of alkaloidal poisons, by Arthur L. Greene; on the determination of nitrogen by soda-lime, by W. O. Atwater; on indirect determination of calcium, by W. H. Herrick; on a new method for the preparation of anhydrous aluminum chloride, by C. F. Mabery. *Plant Chemistry* (agricultural and pharmaceutical), on the composition of wild-cherry bark, by F. B. Power and Henry Weimar; on the chemical composition of the juices of sorghum-cane in relation to the production of sugar, by H. W. Wiley; note on the chemistry of germination, and on the absorption of nitrogenous nutriment by the roots of plants, by William McMurtrie; on a compound rich in carbon occurring in some plants, by Helen C. DeS. Abbott. *Organic Chemistry*, on the fatty acids of drying oils, by L. M. Norton; on some higher homologues of cocaine, by F. G. Novy; on the salts of benzene-sulphonic acid with the amines, on some new metallic salts of benzene-sulphonic acid, on the amine salts of para-toluene-sulphonic acid, on the action of silicon fluoride on acetone, on the limits of the direct bromination of acetone and on the action between ammonium sulphocyanide and monobrom-acetone, on the action of chlorine on acenaphthene, on the urates of ammonium and the amines of the fatty acids, and on some new nitro-prussides, by T. H. Norton; on the action of aromatic amines upon certain substituted unsaturated acids, and on the constitution of the sulphur compounds in crude petroleum oils, by C. F. Mabery. *Mineral Chemistry*, on the composition of Lockport Sandstone, by H. W. Weld; on the processes of soil-formation from the north-western basalts, by E. W. Hilgard; on the occurrence in nature of a copper antimonide, and on certain alloys of calcium and zinc, by T. H. Norton; analyses of two manganese minerals, by F. C. Novy. *Theoretical Chemistry*,

on the significance of 'bonds' in structural formulas, by Spencer B. Newberry; on positive and negative units of valence, by Albert B. Prescott. *Physiological Chemistry*, on the percentage of ash in human bones of different ages, by W. P. Mason; on chemical changes accompanying osmose in living organisms as illustrated by the oyster, by W. O. Atwater; on the delicacy of the sense of taste, by E. H. S. Bailey and E. L. Nichols; on the scientific basis of feeding infants, by A. R. Leeds. *Medical Chemistry*, on the causes, progress, and cure of a recent great outburst of typhoid-fever at Mount Holly, N.J., by Albert R. Leeds. *Committee Reports*, on methods of stating water-analysis, by G. C. Caldwell; on indexing chemical literature, by H. C. Bolton.

Prof. L. M. Norton, in his experiments in drying oils, has detected the presence of several fatty acids, which are not mentioned in the books. Especially is this the case with cottonseed-oil, which contains several acids in addition to oleic. Owing to easy oxidation, it is difficult to separate these acids. The method of distillation in a vacuum was found most effective. Prof. T. H. Norton's papers on organic chemistry disclosed numerous lines of original investigation undertaken in connection with advanced students, and emphasized the growing importance of mingling original researches with instruction, which is now practised so successfully by the leading laboratories of the world. The papers on analytical chemistry contained nothing of general scientific interest. The alloys of copper and antimony and of calcium and zinc presented by Professor Norton disclosed many important facts. He found it impossible by any known method to obtain an alloy of zinc and calcium containing more than five or six per cent of the latter metal. The properties of the compound are also profoundly affected by the proportion of calcium present.

Dr. Wiley presented, in the paper on sorghum, the means of all the recorded analyses of sorghum-juices. The important fact is brought to light that this average juice is unfit for sugar-making, containing at the rate of a little over twenty pounds of available sugar to the ton of cane. In many instances, however, the percentage of sucrose in the juice is remarkably high. The successful solution of the problem of sugar-making from sorghum depends on the production of a uniform grade of sorghum reasonably rich in sucrose. This should be the work of the agricultural experiment-stations.

The sense of taste, as shown by the experiments of Professors Bailey and Nichols, is in general more delicate in females than in males. Bitter is detected in far greater dilutions than sweet or saline tastes.

This session of Section C was remarkable in being almost free from papers of a 'cranky' nature. No lurid schemes for the regeneration of the human race by chemical affinity were presented, and no intensely improbable properties of matter were described. While many of the papers were crude and some of them quite elementary, it is nevertheless true that the Chemical Section is progressing in numbers and influence and the character of its work.

Section I.

THE Section of Economic Science and Statistics this year exercised its usual latitude in the consideration of a great variety of subjects; but, under the close scrutiny of its sectional committee and the rulings of its chairman, everything objectionable was excluded and a high standard maintained. Thus, while all the subjects presented were treated in a scientific manner, the proceedings were so conducted as to meet with popular favor. Although inconveniently located on the upper floor of Hamilton Hall, so that those unacquainted with the ways of the association had difficulty in finding the place, the sessions of this section opened with a room nearly full, on Thursday, and the attendance daily increased until the closing session on Tuesday (Aug. 23), when the hall was uncomfortably crowded by the largest audience present at any sectional meeting during the week.

'The Food-Question' was, by special arrangement, made the sole topic for Thursday. The sessions, both forenoon and afternoon, were opened by Prof. W. O. Atwater of Connecticut, who treated the subject much after the style of his articles in current issues of *The Century Magazine*. He was enabled to add much interest by a fine collection of illustrative material, some of the charts being his own, but the rest prepared at the Massachusetts Institute of Technology, and loaned for this occasion by The Industrial Education Association of No. 9 University Place in this city, through the kindness of Miss H. R. Burns. Much interest was manifested at both sessions, and the discussion took a wide range, including the economy of food in its physiological and pecuniary aspects, the food of workingmen in its relation to work done, and the preparation of food, together with the 'cooking-schools' and their results. The most prominent participants in the discussions of the day were Prof. W. H. Brewer of New Haven, E. J. James of Philadelphia, S. A. Lattimore of Rochester, J. M. Ordway of New Orleans, Dr. D. E. Salmon of Washington, Mrs. Richards and Mrs. Lincoln of Boston, and R. T. Colburn of this city.

On Friday the section gave its attention to statistical and financial questions. The leading paper was by Prof. Edmund J. James of the University of Pennsylvania, and was mainly a sharp and well-presented criticism of the recent essays of Mr. Edward Atkinson upon the growth and rapidly increasing wealth of this country. Dr. James showed grave omissions in Mr. Atkinson's figures, which greatly modified the deductions from them, and, by marshalling the same statistics in a different form, reached very different conclusions, both as to the country's accumulating wealth as a whole, and the earnings of laborers. Charles S. Hill of Washington followed with a statistical paper somewhat similar in character. Then E. B. Elliott, actuary of the Treasury Department, continued his last year's exhibit of the rates of interest realized by investors in the bonded securities of the United States. He showed, that, based upon the market-prices of the government 4 and 4½ per cent bonds, the actual interest during the past year has never exceeded 2½ per cent, and at times it has fallen below 2 per cent. He predicted a net rate for some time to come, closely approximating 2 per cent.

As with the other sections, business was suspended from Friday noon till Monday morning, by the various excursions, — an interruption emphatically disapproved by many active members.

The morning session of Monday took a rather philosophic turn, although the title of the paper which gave rise to most discussion made a claim to belonging within the realm of science: it was 'The Science of Civics,' by Dr. Henry Randall Waite, and while covering broader ground, served especially as an argument and justification for the American Institute of Civics, of which Dr. Waite is president, and its work. An animated discussion ensued, dealing with ethics, politics (in its best sense), and economics, and their relations to one another. Monday afternoon, Section I joined with that of Mechanical Science in considering the question of Isthmian transit. This subject in its various bearings was clearly presented by Commodore Taylor, Surgeon Bransford, and Engineer Peary, of the United States Navy, and Mr. J. W. Miller of this city; and the interested audience seemed well convinced of the superiority of the ship-canal and the Nicaragua route over all other schemes, and the certainty of the early completion of this enterprise by American capital, and to be under the control of the United States.

Manual training, its methods and results, in public schools and special institutions, from economical, industrial, and educational aspects, formed the principal subject of the final session of the section on Tuesday. Prof. Calvin M. Woodward of St. Louis, and Prof. James of Philadelphia, read papers, and a general discussion followed entirely favorable to manual training in every form.

Yan Phou Lee of New Haven closed the session with an eloquent address upon the Chinese question from a Chinese standpoint, delivered before as large and enthusiastic an audience as any assembled at Columbia College during the meeting of the association. It was a telling arraignment of the policy and conduct of the United States in reference to the Chinese, and reminded one of an epitome of Helen Hunt Jackson's 'Century of Dishonor.'

HEALTH MATTERS.

Cure of Consumption.

AMONG the first to use Bergeon's treatment for the cure of consumption by gaeous enemata in this country, and certainly the first in Philadelphia, was Dr. E. T. Bruen. As a result of the treatment

of twenty-five patients, Dr. Bruen deduced the following conclusions: —

1. In nearly all cases lasting effects have been secured in the reduction of temperature, suspension of night-sweats, lessened cough and expectoration, and in some all physical signs of bronchial catarrh abolished.

2. Temporarily reduction of pulse-rate fifteen to twenty beats, and temperature one-half a degree to one degree during the administration of the gas.

3. The amount of gas introduced into the bowel has varied from three quarts to a gallon at each injection. It has been introduced very slowly, from fifteen minutes to half an hour being demanded by the operation. The administration has been practised in most cases twice in the twenty-four hours. No injurious effects from the gas have as yet been observed.

4. Administration of the gas in different amounts and varying degrees of concentration is now being practised, and also investigations into the characteristics of the sputa.

5. In only one of the cases of phthisis the effects of the gas have been entirely negative.

6. In cases of phthisis complicated by intestinal lesions, experience is still insufficient to make it possible to state positive results.

7. The ultimate value of the treatment can certainly only be established by time. The probable mode of action would seem to be antiseptic, and, by reducing suppuration and the relief of the attending serious symptoms, the patient is permitted to gain by food, exercise, and general treatment. Thus far, the value of the gas seems to be that of a useful therapeutic measure, rather than a curative plan of treatment.

8. The method of preparing the gas for use in the hospital is as follows: the carbonic-acid gas is passed through a solution of chloride of sodium and sulphide of sodium in twenty-two ounces of water. The proportion of the salts has been increased in some cases, and some trials of other combinations are being made.

Of the twenty-five cases treated in the early part of the year, Dr. Bruen has been able to follow fourteen of them continuously. Two have since died. In twelve the physical signs remain unchanged, the temperature still above normal, the flesh and strength not increased after the first gain of an average of five pounds. Yet the patients undeniably feel better. The process of suppuration, with its attendant evils, has been modified, suppressed, or controlled, and it must be admitted that the patients have been benefited by the treatment. More recently Dr. Bruen has applied this method in the treatment of twenty-four cases in private practice, and to thirteen additional hospital cases; so that, in all, he presents sixty-two cases in which the treatment has been applied in a systematic manner.

In commenting on the cases which have come under his care, in a paper read before the Association of American Physicians, Dr. Bruen says that two suggestions may be given for the failure of the treatment to give better results. The first applies only to hospital cases. It is impossible, in a large general hospital, to secure the detailed attention to diet necessary to suit the capricious appetite of the consumptive. In treating consumption it is absolutely necessary to increase the vitality of the tissues so that they will be unfavorable culture-media for the bacilli. The second suggestion is, that in cases with inherited tendencies to phthisis, or in those who acquire a phthisical tendency, there is great vulnerability of the mucous membrane, which even fosters an outbreak of catarrhal processes in the bronchial structures. In this way the good effects of the treatment are constantly opposed. He thinks that suitable climatic environment is an all-important adjunct to the proper settlement of the value of Bergeon's treatment. But it is certainly an important addition to the therapeutic equipment to have an agent capable of influencing very markedly bronchial catarrh in so many cases, especially the stay-at-homes. In a word, Bergeon's treatment is chiefly valuable in those cases of pulmonary disease attended with bronchial catarrh; but it is to be feared that the trouble and detail necessary to its successful use will prevent many from employing the method, and the limitation of its power will cause it often to be set aside for other plans of treatment.

It is more desirable, in the treatment of consumption, to adopt those measures which tend to establish the general health, than to hunt up specific forms of treatment. Suitable climatic conditions, judicious alimentation, and appropriate personal hygiene, are the first principles in the therapeutic management of phthisis, and Bergeon's method should be considered an adjunct to these.

HYDROPHOBIA INOCULATION IN NEW YORK. — Dr. Sommer, an Hungarian physician, obtained the consent of the mayor and president of the Board of Health of New York to conduct experiments with the virus of hydrophobia upon the dogs collected by the dog-gatherers and taken to the pound. The Society for the Prevention of Cruelty to Animals have, however, interfered, and require the doctor to obtain the authority of some medical college or university in the State before they will permit him to conduct his investigations. We should think that an application, properly made, to any of the medical institutions of the city, would be followed by the granting of the requisite authority.

USE OF OPIUM. — Dr. Boynton is authority for the statement that Woodstock, Vt., consumes a large quantity of opium. There are four druggists in the town, and they report that their sales of opium in a single year are sufficient to make one hundred gallons of laudanum, equivalent to one hundred and sixty-seven ounces of morphine. Of this, only five per cent is sold to physicians. It can hardly be possible that there is any greater demand for opium in Woodstock than in other towns of the same size, and yet we can hardly believe that this represents the true condition of things in our New England towns. If so, the thought is a startling one, and should receive more than passing notice.

SEASICKNESS. — We have already mentioned a number of remedies for seasickness. Dr. Sutherland suggests another, which he employed successfully in crossing the English Channel, he escaping when almost every one was sick. He takes a tight hold of one of the pillars supporting the deck, and, as the boat rises in going over a wave, he runs uphill, as it were, reversing the direction of his run when the boat descends the wave.

CETTI'S FAST. — It will be remembered that Cetti, a Norwegian, fasted for twelve days in Berlin under the observation of Professor Virchow. In June he began another fast, of thirty days, for scientific purposes. During the fast he was detected eating gelatine jujubes, about a half-pound of which were found on his person.

SCARLET-FEVER. — Dr. Edington of Edinburgh claims to have discovered a bacillus in the blood, and desquamation, of patients suffering with scarlet-fever. The Medico-Chirurgical Society of Edinburgh has appointed a committee to investigate the bacillus and its relations to scarlet-fever.

BOOK-REVIEWS.

Romantic Love and Personal Beauty: their Development, Casual Relations, Historic and National Peculiarities. By HENRY T. FINCK. New York, Macmillan & Co. 8°

IN the current issue of an American weekly this volume is reviewed under the heading of 'A Curious Book.' This epithet it most decidedly merits. Though the first impression of the work is that of its uncommon character, this feeling gradually gives way to an ever-increasing recognition of the intrinsic importance of the argument it sets forth, until in closing its pages one feels that something has been added to his stock of knowledge, a new light has been more or less brightly cast upon many problems, and that these acquisitions will always be associated with Mr. Finck's book.

The fundamental note of the book is the evolution of love, the most conservative element of human nature, that which poets and essayists delight in pronouncing as always and always to be the same, is shown on proper analysis to be subject to that same developmental process which Darwin has associated with his name. Not only have the affections a natural history in the animal world closely affiliated with appearances in early man, but that form of love that to-day is *the* love par excellence — romantic love — is itself only a very modern development, not a thousand years old.

The passion that gives the ground-tone to modern social life, that plays the chief *rôle* in imaginative literature, that attracts the attention of all travellers and observers, that has revolutionized and is modifying many of the problems which to the sociologist are of

maximum importance, the passion that so permeates our mental tissue that we read ancient history and literature through the spectacles it puts before our eyes, — this passion was unknown, or, where known, neglected, until modern times. This announcement is most startling. If it can be satisfactorily established, it will take its place not only as a most important historical fact, but as a richly suggestive generalization, reflecting light on certain obscure problems of anthropology, giving the marriage and courtship customs of all peoples, primitive, ancient, and modern, a newer, fuller biological meaning, as well as pointing the way to the solution of many social questions of the day which irrelevant and unscientific discussion has done much to confound.

Mr. Finck is a biologist, and includes in his treatment the arrangements for mutual attractiveness of the sexes found in plants and animals. This prevents a too narrow anthropocentric view of the affections, and escapes the danger into which literary men have fallen of regarding as typical what is almost accidental. But first the characteristics, the 'overtones of romantic love,' must be set forth. Mr. Finck enumerates eleven. (1) Individual preference. The savage chief does not hesitate to exchange one bride for another equally attractive; the lover cares for one alone. (2) Monopoly. Not only does he prefer her alone; he expects all her attentions. (3) Any neglect leads to the third 'overtone,' jealousy, which by inspiring watchfulness and fear keeps the flame aglow. (4) Coyness, a feminine trait, which by retarding increases the lover's passion. (5) Gallantry, a masculine trait, acknowledging the conquest. (6) Self-sacrifice, which may be an exaggerated gallantry or a suicidal impulse of unrequited love. (7) Sympathy. No pleasure is complete unless enjoyed by both. (8) Pride of conquest or possession. (9) Emotional hyperbolæ. The lover sees, thinks, and feels in superlatives. (10) Mixed moods. Finally, (11) Admiration of personal beauty, — that all-important æsthetic overtone that now more than ever leads the way to love.

Many of these qualities are shown by animals. Individual preferences, gallantry, jealousy, sympathy, are illustrated in many authentic anecdotes. Birds especially — and along with this goes their monogamous habit — show a much more refined and noble courtship than the lowest savages. In savage life, where courtship consists in knocking the girl on the head and carrying her away, love can hardly find a place. Even in the higher forms of courtship by purchase or service, nothing but a very rudimentary form of real love can enter. Individual preference there was none; polygamy flourished. The woman was the slave, and none of the romantic virtues were possible. In historic nations the advance is at first small. Egypt had trial marriages of one year's duration. Amongst the Hebrews polygamy, the exclusion of woman from all but the minor social duties, and the selection of the wife by the father of the suitor, prevented true romantic love, in spite of the elevation of the woman to be the companion of man, which that nation introduced. The Greeks show no true love-stories. They say much of connubial love; filial and sisterly love is a frequent theme. Friendship and platonic love is the type of the highest Greek affection. The women were excluded from the living interests of the nation; male beauty was the admired type. Rome made an advance, but not a great one. Engagements were made by parents at a very early age. Social customs forcing the girl to marry one of the same profession as her father, and the like, prevented a choice. In later days marriage was a farce, and divorce the rule. The poets, in advance of their age, uttered a few strains of romantic love; Ovid especially pleaded for gallantry and the tender emotions. But all such beginnings were crushed by mediæval asceticism. Marriage became almost a degradation, celibacy a virtue; beauty and the personal hygiene that led to it were considered sensuous. Love was to be subdued and self-mutilation rewarded. Only with the dawn of the renaissance did love again begin. Dante was the first love-poet; Romeo was the first hero-lover of a play. The chivalry that preceded these was either merely fictitious and fashionable, or more usually an adoration of a married lady. It was not a courtship. The poets sound but a weak strain of romantic love. Even Spenser puts friendship above love. If the reader will imagine this outline filled in with a host of corroboratory passages, cited from recognized authorities, he must admit that Mr. Finck has made out a very strong case indeed. Moreover, his scheme of the evolution of love answers a critical biological test. The law that the individual epitomizes the race holds here. Historically, maternal love is the oldest and strongest (until romantic love appears). "Then paternal, filial, and fraternal love are gradually developed, followed by friendship (Greek) and finally by love proper." The baby first and most loves its mother; then the father receives attention, followed by sisters and brothers. At school the Greek devotion and friendship develops. Finally comes true love, which, usually passing like the blind chivalry of old through a 'calf-love' stage, emerges into romantic passion.

Into the author's long and careful analysis of modern love it will be impossible to enter here. His guiding principle is that love, 'natural selection,' is the bulwark of civilization. In comparing the customs of various nations, those are regarded as highest that give freest opportunity for social intercourse of the young, that widen the play of selection, and thus lead to the amelioration of the race. It is the excluding of French girls from a rational education, the marrying them out of convents, that causes their homeliness and the degeneracy of that race. The German system of chaperonage and formal social equality in marriages is tending, though less seriously, to the same end. In England and especially in America have the agencies that lead to a betterment of the race full and free play. This is precisely the view taken by Mr. Grant Allen. He regards falling in love as the expression of the healthy instinct of mankind; and looks for the improvement of the race, not in any artificial system of scientific or any other kind of mating, but in removing the trammels from the free choice of partners, — in discountenancing all but love marriages. All this has an important practical bearing which Mr. Finck well expresses. He holds that "love may be safely accepted as a guiding-star in making a proper division of the world's labor between men and women." This point of view pleads for the true higher education of woman, for giving her that intelligence without which beauty is dead, that live interest in the world's activities without which frivolity is inevitable. The contrast between the homely, studious, earnest, retired maiden and the pretty, lively, society-loving, frivolous, but silly and ignorant girl is one that the perverseness of man has created. A natural education will go far towards removing it. Again, the tendency of civilization is to make men and women more and more different (we are not speaking of legal and social privileges); the recent attempt to make women masculine is biologically absurd. "Whatever approximation there may have been has been entirely on the part of the men, who have become less coarse or 'manly,'" while woman has correspondingly increased her own refinement. The spirit of the women's rights movement is in opposition to the impulse of romantic love, and will perish accordingly. Finally, this point of view refutes the notion that intense love is inconsistent with intellectual culture. On the contrary, only the highest culture can appreciate romantic love; intelligence is an obstacle to marriage only in a silly society; the education of the head and the heart go hand in hand. True culture teaches, not that this instinct is opposed to the highest life, but that all the refinements of civilization have been gained by the virtues which it has taught men to appreciate. The evolution of romantic love will continue until it has stamped out all other artificial modes of promoting marriage.

The rest of the book is taken up with a minute discussion of personal beauty. Much interesting and readable matter is there set forth: the scientist will be glad to read that the close relation between true beauty and health is so strongly and ably set forth. Just as morality and hygiene have drawn closer together under a scientific treatment, so hygiene and æsthetics begin to overlap when looked at in the light of science.

Mr. Finck's book is sure to attract great attention. According to a literary periodical, a German translation is in preparation. The genial vein of humor that runs through much of it will attract the popular reader, and the personal interest of the many titles in the preface is sure to allure those interested in themselves. But, from a scientific point of view, this is a fault of the book. A serious paragraph suggestive of deep reflection is followed by a witty satire on society or a light fling at a local abuse. Mr. Finck wants his book to be taken seriously. A glance at the wide bearing of the topic will at once convince the reader that the serious aspect of the problem is supremely important. Consider in the first place

that romantic love is consistent only with a monogamous society and that this kind of society is the bulwark of civilization; consider, too, that the ways of finding one's mate not only gives tone to the social institutions of a nation, but, according as they are in accord with or opposed to the inexorable laws of heredity and selection, make for the amelioration or degeneration of the community; consider, next, that the education of the next generation is profoundly influenced by our views of courtship and marriage; consider how this fact will influence our conceptions of ancient life; consider that the division of labor between men and women, and the admittance of women into occupations until now monopolized by men, can only be satisfactory settled by a settlement that does not interfere with the reign of romantic love; consider, in short, that all that is deep and valuable in cultured life is here at stake, — and all must admit that a knowledge of the laws of evolution as they affect sexual selection amongst us is of the profoundest importance. Such inquiries into the nature of human faculty as Mr. Galton is pursuing are directed towards supplying this information. This knowledge is not for the many; but in the hands of the few it is to be converted into public sentiment against certain customs and ways of thinking and in favor of others, by which, eventually, misery will be checked and happiness increased. If Mr. Finck will accept a suggestion, the present writer would urge upon him the preparation of a review article embodying the main points in the evolution of love, and expounding in a strictly scientific style, and without any feuilletonistic *bon mots*, the anthropological, sociological, and psychological significance of this new[1] contribution to human development.

The Hidden Way across the Threshold. By J. C. STREET. Boston, Lee & Shepard. 8°

The Mark of the Beast revealed by the Shape of the Head. By LUCILLA R. HEDLEY, M.D. Philadelphia. 8°

THE reviewer of books like these is in no enviable position; especially as the reviews are written for those interested in science, and the books any thing rather than scientific. The first is another of those ponderous volumes — a combination of strange mysticism, excited exhortation, wild symbolism, unscientific cant, and childish credulousness — that one finds heaped up on the shelves of a second-hand book-store. The author writes powerfully, makes his points ably, appeals to his reader skilfully, and here and there makes a noble plea for the despisal of the sordid and the living of a high intellectual life. But those portions of the book in which one feels the rationality and the earnestness of the writer give the impression of being aloof from the real purpose of the work, — accidental at least, if not inconsistent.

The weirdness of this intellectual conglomerate, it is hard to describe: the cause of such writing seems to be an hypertrophy of that sentiment, common to all specialists, that the public at large does not stand in sufficiently close contact with them; that they live a life exclusive, — the life of an adept, an occultist. Mr. Street, A.B.N., fellow of the order S.S.S., and of the brotherhood Z.Z. R.R.Z.Z., is such an adept: "the mystery which hath been hidden for ages and from generations" is revealed to him. He is in the clouds, but the ladder, alas! is still to be found. The present writer, at least, fails to get the slightest inkling of the process, save that it seems much like dropping common sense and giving one's self over to wild fancy and morbid illusion.

The following extracts will perhaps be sufficient to enable the reader to decide with which one of the categories into which he is accustomed to divide books, this one belongs. Amongst the original contributions to science here announced, we read that "the Sun and Planets in space, as well as terrestrial objects, have their magnetic, odyllic, and astral emanations, and these exert influence upon each other and upon every organized being, in proportion to their size, their distance, and the velocity of their revolutions." "This Astral influence is conveyed to man, and acts upon him through the Astral light. This, the palmister tells us, is composed of the seven fluids which emanate from the seven primary planets respectively. These fluids, separately and in their combinations, are tempered and modified by the sun and moon." And so on. Here is a wonderful discovery: the sensations arising from the cut nerve-strings of amputated limbs we thought explained by the physiological law of the external projection of sensation. But, no! "All this is due solely to the action of the Star-magno, or Astral, vibrating between the amputated limb and the patient. So frequent and almost universal are such occurrences [i.e., cases in which the patient feels amiss because something is wrong with his lost member: a number of such are cited] that all surgeons use the utmost caution in disposing of amputated limbs." "The Astral body, enclosing the Soul like an atmosphere, can be and has frequently been seen by attendants and physicians, leaving the animal body just at the moment of separation between Soul and body, known as death or dissolution." Under proper light, there is seen accompanying the death-rattle "a column of thin ethereal violet blue vapor vibrating and oscillating, ebbing, finally passing upward and fading away." As a piece of logic, the following cannot be excelled: "The golden sunlight produces vibration to the amount of 500,000,000 of millions in a second" proportioned amongst the several colors in such and such a way. "Of course, therefore, different colors must necessarily affect the human soul," etc. "Love comes from pink and bright red, Hope and Faith from violet, Truth of blue, Melancholy of yellow, Epilepsy of pearl white," etc.

Let us hear what the author holds regarding the material basis of modern Spiritualism, that now stands in so bad a light. He gives full details for forming spirit circles, which practically amount to employing all conditions that make rational observation impossible, and neurotic self-deception inevitable, and assures all that the failure of manifestations is always due to the bad influence of sceptics and the like. "Students of occult mysteries," he warns them without seeing the double interpretation of his words, "never permit scientific investigators or psychic-research committees to control or even be present in the room during your efforts at development of mediumship. Remember thought is a potential atmosphere. Their worldly-wise theories create opposing vibrations and congeal the Spirit. Even in large rooms and at a distance their presence is highly objectionable." If to this we add the definition of 'a medium,' the reader will be able to imagine the rest of the chapter. Here it is: "To become a medium is to learn to vibrate the Astral body as a pendulum between Spirit and mortal, and thus to reach the third state of being, the state between sleeping and waking, — Trance — a condition co-equal with both, is to have found the Key that unlocks the mysterious place where actual Soul semblances have their immortal birth."

That this omnivorous 'psychist' unfolds the theory of soul-migrations; shows the rationality of faith-cure (e.g., to cure consumption you must insist that it is not inherited, that "tubercles, hemorrhage, inflammation, and ulcers are only ugly names and beliefs, not spirit and truth of man"); expounds the mysteries of theosophy; and indorses the cabalistic literature of all ages and nations, — is easily believed. For this he has six hundred pages at his disposal.

Considering the volume as the sincere and earnest expression of an enthusiast for the spiritual side of life, — and this is the most charitable point of view, — it is still a pernicious work. It embeds the kernel of truth it contains with a husk of rubbish; it chokes up 'the threshold' with a refuse-heap. By so doing it fosters an immoral trade, — a scandalous appeal to the sentimentalities of simple-minded folk. It debases the value of true spirituality, draws men's activity away from the proper duties of life, cultivates a life of useless solitude, and, moreover, is unscientific and unprogressive. With a healthy public taste, such a book can have no success.

The second book is indeed an absurd piece of pseudo-scientific writing, and can be dismissed with a word. The idea of the book is, that the 'mark of the beast,' as mentioned in the Book of Daniel, refers only to the leopard, bear, lion, and dragon. There are given pictures of the heads of noted criminals, showing their resemblance to one or other of these animals. They had 'the mark of the beast,' and, had we only known it, their crimes could have been prevented. Besides this, there is much phrenology, some little Spiritualism, several untrue statements, and a host of Scripture quotations not always relevant.

[1] Mr. Finck thinks that the reason why no one has called attention to this recent origin of romantic love is that no sufficient distinction has been drawn between romantic and conjugal love.

Melting and Boiling Point Tables. By THOMAS CARNELLEY. London, Harrison & Sons. f°.

THE issue of the second volume of Carnelley's 'Melting and Boiling Point Tables' completes the valuable compilation, which now comprises more than fifty-one thousand data systematically arranged with a view to ready reference. Beside the melting and boiling points, so far as known, of individual chemical compounds, organic and inorganic, and such information as is at hand concerning their constitution, boiling-points of miscellaneous materials and mixtures, freezing-points of mixtures and solutions, and vapor-tensions of simple substances, mixed liquids, and saline solutions, are included. The statement of the relation between the numbering of volumes and the years of issue of the more important periodicals of chemistry and physics, and an alphabetical index of the 'root-compounds' of carbon, are minor conveniences. The list of authorities and original sources of knowledge, which really is an index to the literature, is not the least important feature of the work; and the additional references to correlative information in Watts's 'Dictionary of Chemistry,' and the Journal of the Chemical Society, will be especially appreciated by readers whose consulting libraries are not full. The work, planned so ambitiously and executed with the care which is evident, forms an important contribution to the resources of workers in physics and chemistry; and the many who will make use of it may very properly felicitate themselves upon the fact that the author, who is of the few endowed with the aptitude and patience necessary to complete the undertaking satisfactorily, possessed the fortitude to enter upon a course of such colossal drudgery.

Educational Mosaics. By THOMAS J. MORGAN. Boston, Silver, Rogers, & Co. 12°.

THIS work, compiled by the principal of the Rhode Island State Normal School, is a collection of extracts from a great number of writers, chiefly modern, on topics connected with education. Its appearance is one more sign of the great interest now taken in the subject with which it deals, — an interest that seems to grow greater every year. There has, indeed, been a great awakening in the public mind of this country in regard to education. It is not many years since our educated classes seemed to be very well satisfied with the knowledge and training they possessed, and to think it good enough for their successors; while public speakers and writers were never weary of proclaiming that our public schools were all that could be desired, and our people the most enlightened on the earth. We have learned better since those days, and have become painfully aware that our higher education is by no means what it should be, that the education of the masses is equally defective, and that the methods of teaching in all our schools admit of much improvement. The book before us faithfully reflects the present state of the public mind and the various shades of prevalent opinion. The subjects treated are necessarily very varied, yet questions of present interest are given far more space than all others; and, as both sides of every controversy are given, the reader obtains a pretty good idea of what the best thinkers on educational topics are now saying. Among the subjects most largely treated are the relative importance of the classics and the physical sciences, the need of studying English, the necessity of moral training, the higher education of women, and the improvement of the methods of teaching. The controversy between the friends of the classics and those of the physical sciences is naturally a prominent feature of the work; and, though the number of extracts is much greater on the side of the classics, this is probably due to the fact that as yet the greater number of educators are on that side. The large number of extracts relating to moral education show that our educators are alive to its importance; but they show also that there is much uncertainty as to how much education is to be given. Indeed, the art of teaching virtue seems to be as difficult and as perplexing now as it was in the time of Socrates.

General Morgan's book will be of great interest, not only to practical teachers, but to all persons interested in education. The only criticism we should be inclined to make is as to the arrangement of the extracts, which is according to the alphabetical order of the authors' names, while we should have preferred an arrangement by topics. The book is one to be taken up again and again for the stimulating thoughts it contains; and teachers, in particular, will find it an excellent companion.

Gilman's Historical Readers. Nos. 1, 2, and 3. By ARTHUR GILMAN. Chicago, Interstate Publ. Co. 16°.

IF the young people of this country are not properly educated, it will not be for want of books intended for their perusal. In every department of literature that is adapted to young intelligences, books in great numbers may be had at low prices, and numerous additions are made to the list every year. The quality of the books, however, often leaves much to be desired. Indeed, the writing of books for children is an art by itself, quite different in some respects from that of writing for adults, and calling for special qualifications in the writer. Many books intended for the young fail of their purpose because they are dull, or because the style is obscure, or because they contain matters above the comprehension of juvenile readers. These little books by Mr. Gilman on the study of American history are not liable to these objections. The author's style is simple and clear without being undignified, his choice of topics judicious, and his manner of telling his story such as can hardly fail to interest youthful readers. The majority of brief histories are so overloaded with details, that young readers, and indeed readers of all ages, find it impossible to grasp them all, and are apt to grow weary of the study. Mr. Gilman has, for the most part, successfully avoided this fault, only a few of his chapters being crowded with detail, and these generally for some special reason.

The first of these little readers treats of the discovery and exploration of the country, the second of the colonization period, while the third and largest of them is devoted to "the making of the American nation." In the first volume the subject is so romantic that children can hardly fail to take an interest in it; and Mr. Gilman has made the most of this quality of his subject, yet without neglecting its more important aspects, so far as these are intelligible to very young readers. The second volume presents, in the main, similar characteristics, though the subject is more complicated. The third and concluding volume is somewhat deeper in thought, as well as larger in size, than either of the others. The greater part of it is, of course, devoted to the Revolution and the early years of the national life; but the history is carried on in brief to the end of the reconstruction period, the author holding that "the making of the American nation was not completed until the supremacy of the Union was acknowledged in every part of the land. The young American who familiarizes himself with the contents of these little books will not only have gained a good general idea of the history of his country, but will have laid a good foundation for a deeper and more extensive study in later years.

The Upper Beaches and Deltas of the Glacial Lake Agassiz. (U. S. Geol. Surv., Bull. No. 39.) By WARREN UPHAM. Washington, Government. 8°.

THIS bulletin is but an initial contribution to our knowledge of Lake Agassiz. The investigation is still in progress, and the general discussion of data and the eduction of conclusions are mainly reserved until its completion.

Lake Agassiz belongs in the same category with Lakes Bonneville and Lahontan, in that it is a large extinct lake dating from the close of the glacial epoch. But in its situation and origin, and the cause of its extinction, it is radically different from these ancient lakes of the Great Basin. The basins of the latter belong to the constructive type of Davis, being due to profound oscillations of the earth's crust, and these lakes owe their disappearance solely to climatic changes resulting in the gradual predominance of evaporation over precipitation.

The basin of Lake Agassiz, on the other hand, belonged to the obstructive type, owing its existence to the damming up of the Red River of the North and its tributaries by the southern edge of the continental ice-sheet during its gradual recession from the sources of that stream to Hudson Bay; and, although the disappearance of this lake can also be traced to a climatic change, it was not a change from humid to dry, but from cold to warm, the lake vanishing with the icy barrier that retained it. During this retreat free drainage from the melting ice could not take place, because the descent of

the land is northward. As soon as the border of the ice had receded beyond the watershed dividing the basins of the Minnesota and the Red Rivers, it is evident that a lake, fed by the glacial melting, stood at the foot of the ice-fields, and extended northward as they withdrew along the Red River valley to Lake Winnipeg, filling this valley and its branches to the height of the lowest point over which an outlet could be found. Until the ice-barrier was melted upon the area now crossed by the Nelson River, thereby draining this glacial lake, its outlet was along the present course of the Minnesota River. At first its overflow was upon the nearly level, gently undulating surface of the drift, about 1,100 feet above the sea; but in process of time this cut a channel 125 to 150 feet deep and from one to two miles wide, in which lie Traverse and Big Stone Lakes, respectively 970 and 962 feet above the sea. From this outlet the plain of the Red River valley, 30 to 50 miles wide, stretches 315 miles north to Lake Winnipeg, which is 710 feet above the sea. Along this entire distance there is a very uniform continuous descent of a little less than one foot per mile. The drift deposited by the ice-sheet upon this area, together with that which may have been dropped by floating ice borne on the waters of the lake, and the silt brought in by glacial rivers and by those of the surrounding land, were here received in a lake, shallow near its mouth, but becoming gradually deeper northward.

Beyond our national boundary, Lake Agassiz covered a broad expanse, including the basins of Lake Winnipeg, Red and Rainy Lakes, and the Lake of the Woods. Its breadth varied from 100 to 200 miles, with an extreme length of at least 600 miles and an area, at the time of its greatest extent, exceeding that of Lake Superior.

The most interesting geological features of the basin of this ancient lake now observable are the terraces or beaches formed along its shores at different levels as its outlet was gradually lowered by erosion. These beaches are continuous ridges of sand and gravel, unbroken, save where crossed by modern streams or expanded into the deltas of the ancient lake, whose outlines are thus accurately traced at four distinct levels. The highest or Herman beach is, at the southern end of the lake, 1,045 feet above the sea, or 85 feet above Lake Traverse, and the lowest beach.

Mr. Upham's careful determinations of the altitudes of the beaches have fully established the remarkable fact that the beaches are not level, but have a gradual ascent northward, as compared with the present level line or the surface which a body of water would have now if confined in this valley. The rate of ascent of the highest or Herman beach increases gradually from six inches a mile at Lake Traverse, to above sixteen inches a mile near the national boundary, the total ascent in this distance being 185 feet.

The several beaches are not parallel, the rate of ascent diminishing from the highest to the lowest beach. Thus the second beach is 120 feet, the third 65 feet, and the fourth or lowest 35 feet, higher at the national boundary than at Lake Traverse.

The altitude of the beaches is a function of the longitude as well as the latitude; for a comparison of these beaches in Dakota and Minnesota at the same latitude reveals an ascent from west to east similar to that from south to north, but of less amount, and diminishing in a similar ratio between the successive stages of the lake.

Various causes for these interesting phenomena are suggested and reserved for future discussion; but Mr. Upham indicates his adoption provisionally of the view that the divergence of these ancient shore-lines from the present level line was produced by the gravitation of the water of the lake toward the ice-sheet. At first this attraction would have been relatively large, because of the nearness of the great mass of ice on the north-east in Minnesota and northward in British America; but, as the ice retreated, it must have been gradually diminished, and reduced to a comparatively small influence by the time the ice-sheet had withdrawn so as to permit the northward drainage of the lake.

NOTES AND NEWS.

TWO new methods of determining the density of the earth are being experimented upon at Berlin. The one, by Dr. F. Richarz and Dr. A. König, has been referred to in *Science* (v. 217). These gentlemen apply a sensitive balance with a double pair of scales, one swinging above, the other below, a heavy parallelopipedic mass of lead, which consists of a number of blocks which are exactly measured and weighed. The blocks are perforated, and the wires connecting the upper and lower scales pass through the shaft formed by these perforations. By an ingenious arrangement, the weights, which consist of spheres of lead, can be changed from the upper to the lower scales without opening the case in which the balance is enclosed. The principle on which the experiment is founded is, that, if one of two equal weights is below, the other above, the mass of lead, its attraction will diminish the weight of the former and increase that of the latter. The proportion between this increase and the total weight gives the means for determining the proportion between the attraction and masses of the lead and the earth. Preliminary experiments made with this balance show that a great exactness of the definite measurements may be expected. These experiments are being carried on under the auspices of the Berlin Academy of Sciences in a casemate of Spandau. At the same time J. Wibring is experimenting by another method in the astrophysical observatory at Potsdam. He uses a pendulum made of a brass tube one metre in length and four centimetres in diameter, with spheres of cast iron weighing five hundred and fifty grams at the two ends. A knife-edge of agate six centimetres in length passes through the centre of the tube, and swings on an agate rest. Two small mirrors are attached to the knife-edge, and the oscillations of the pendulum are observed through a telescope. The time of oscillation of the pendulum may be so nicely regulated that oscillations of five minutes length are perfectly regular. Near the iron spheres and opposite to one another, two iron cylinders weighing 325 kilograms are placed, the lower one attracting the lower end of the pendulum to one side, the upper one the upper end to the opposite side. The attraction of these masses affects the oscillations of the pendulum. The result of these observations for the mean density of the earth is 5.594 ± 0.032. The mean of former reliable observations being 5.57, the new figure corresponds well with these. Both experiments will result in a more accurate and trustworthy determination of the mass of the earth.

— In a recent paper on literary catalogues, Mr. Samuel H. Sindeler makes some suggestive remarks about the system of cataloguing now so much in favor. To quote his words, "Paradoxical as it may sound, the very excellence of his [Dewey's] plan is one objection to it. Mr. Dewey multiplies co-operative advantages to those who use his system to such an extent, that if he lives long enough he will make it so much to the advantage of newly forming or growing libraries to use it, that none will be independent enough to modify it. And why should they wish to modify it? Simply because, less than fifty years ago, the present scheme could not have been formed. There was not knowledge enough in the world. There could not now be found, in any scheme then formed, place for a long range of subjects which appear in his actual classification. This is especially true in science, and who shall say that history will not repeat itself in the next fifty years? Let us rather work out the problem of the decimo-mnemonic system on different lines, each library or group of libraries for itself, according to the special needs of the same. Then new Deweys will arise and ply their ingenious arts, and in the millennium the fittest will survive. At present there is danger that the fittest will be handicapped. To give the fittest, when it comes, an earlier chance of survival is one purpose of this paper."

— Cumming's 'Electricity Treated Experimentally,' which was reviewed in the last number of *Science*, is published in America by D. Van Nostrand.

LETTERS TO THE EDITOR.

*** The attention of scientific men is called to the advantages of the correspondence columns of* SCIENCE *for placing promptly on record brief preliminary notices of their investigations. Twenty copies of the number containing his communication will be furnished free to any correspondent on request.*

The editor will be glad to publish any queries consonant with the character of the journal.

Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

Chrome considered as a Poison.

MY attention has been called to an article by Mr. William Glenn of Baltimore in *Science* (x. 58), entitled 'Chrome considered as a Poison,' criticising a paper of mine in the *Boston Medical and Surgical Journal* on the same subject. Were it not that the criticism appears in a scientific journal of high standing, I should

hardly have considered it as meant to be taken seriously, but, appearing as it does, I must beg space to answer some of the writer's points in some detail. Mr. Glenn says that the paper, "curiously enough, does not offer the slightest evidence that chromium or any of its compounds, in any quantity, however large or small, can injuriously affect the animal body. Furthermore, there is no reliable tradition or literature to that effect." It is barely possible that the gentleman may have been misled by a statement in the paper referred to, that I had been unable to find any reported cases of general or local affection attributable to chrome-mordanted clothing. No evidence was offered as to the poisonous character of chromium compounds on the animal body, for the reason that it was supposed to be a matter of common knowledge with the medical gentlemen before whom the paper was read. As to literature, I suppose that everybody will concede the reliability of the few authors (out of many) whom I will quote.

Wharton and Stillé (*Medical Jurisprudence*, 4th ed. vol. ii., Philadelphia, Kay & Bro., 1884) say of bichromate of potassium, "This salt, being extensively used in dyeing, has given rise in several instances to accidental poisoning. Locally applied, its action is irritant, causing in the workmen who use it troublesome sores and ulcerations upon the hands. Taken in poisonous doses internally, its action is highly irritant also, and death has been caused by it with the symptoms usually attending the action of irritant poisons. . . . Several fatal cases have occurred in Baltimore." A number of cases are reported in detail. "Experiments upon animals have shown, that, after the subcutaneous injection of chromic acid, animals suffer from vomiting, diarrhœa, albuminuria, and finally die in a few days: after death inflammation of the kidneys is found. The same results were produced by the injection of a neutral chromate (yellow chromate of potassium)."

Taylor (*A Treatise on Poisons*, London, Churchill) says, "There can be no doubt that bichromate of potassium is an active poison," and quotes the following case from Beck's 'Medical Jurisprudence,' which is also quoted by Stillé: "Dr. Baer of Baltimore has reported the following case. A man, in drawing off a solution of the bichromate by a siphon, accidentally received a small quantity into his mouth. In a few minutes he perceived great heat in the throat and stomach, and this was followed by violent vomiting of blood and mucus. The vomiting continued incessantly until his death, which took place in five hours. On dissection the mucous membrane of the stomach, duodenum, and about one-fifth of the jejunum, was destroyed in patches. In this case the salt acted as a corrosive irritant."

Schuchardt (*Maschka's Handbuch der gerichtlichen Medicin*, Band ii., Tübingen, 1882) says, "Poisoning by chrome compounds (including lead chromate) is not rare. The chromic-acid compounds are more or less violent poisons." Reference is made to numerous cases. "According to the researches of E. Pelikau (*Beiträge zur gerichtl. Med. Toxikologie und Pharmakodynamik*, Würzburg, 1858), bichromate of potassium is very similar in action to arsenic and corrosive sublimate. It causes, when taken into the stomach, marked inflammation of the same and of the intestine; easily causes vomiting, and, after absorption into the system, calls forth a train of general symptoms, particularly albuminuria and hemorrhage from the kidneys, and causes death with more or less rapidity." Reference is made to the results of the observations of Gergens (*Arch. für experiment. Pathol. u. Pharmakol*, Band vi., 1876), Weigert (*Die Bright'sche Nierendegeneration vom pathologisch-anatomischen Standpunkte*), and Kabierske (*Die Chromniere*, Breslau, 1880). The experiments of Gergens were repeated by Posner (*Virchow's Archiv für pathol. Anat.*, Band lxxix., Heft 2), with the same results. "The action of this poison on the general system is extraordinarily rapid and intense."

Falck (*Lehrbuch der Practischen Toxikologie*, Stuttgart, 1880) says, "Cases of poisoning by compounds of chromium are not rare. We find reported up to the present time (1880) seventeen cases, of which three were from chromic acid, two from the chromate and twelve from the bichromate of potassium. Of the seventeen cases, nine (or 53 per cent) ended fatally. . . . Workmen in dye-houses who have to deal constantly with solutions of chrome compounds are afflicted with painful deep ulcers on the hands, which heal with great difficulty; similar affections may be produced by the same substance in the form of dust. . . . Experiments on the effects of chromates on animals have proved the intense poisonous action of these substances. According to Gergens, rabbits died after the subcutaneous injection of 0.26 of a centimetre of chromate of potassium, and showed hyperæmia of the intestinal tract, nephritis, and cystitis. According to Priestley, the vaso-motor centre is first excited, then paralyzed. Mayer found chromium in the blood, heart, liver, and kidneys."

Many more authors could be quoted on this point, but the above is, I think, enough; and, furthermore, the evidence quoted is a sufficient reply to the negative evidence of the weavers in the Philadelphia mills, the dyers, and bichromate-makers interviewed by Mr. Glenn. With regard to the cases reported by me as being caused by chrome mordants, I wish to say, in the first place, that they were not reported for the purpose of beginning an agitation against the use of bichromate as a mordant, nor was it my idea to cause needless alarm among the people. The paper was written for a medical society, and was intended to call to the attention of the members a possible cause of affections of the skin, the removal of the cause in any given case being of a certain value in treatment. I am very well aware of the great value and importance of the bichromate as a mordant, and also of the fact that to the vast majority of people clothing dyed by its aid is not likely to produce any injury under ordinary circumstances; and any idea of restricting its use as a mordant on account of an occasional idiosyncracy would seem to me as absurd as to legislate against railroads on account of the possibility of accidents. I have worn, as have others of my acquaintance, clothing (including stockings) dyed with the aid of bichromate, without experiencing the least injury therefrom, and the same is undoubtedly true of thousands of others; but neither these facts nor Mr. Glenn's experiments are conclusive evidence that everybody is exempt. The grounds for concluding that the trouble in these cases was due to the mordant seem to me to have been justifiable. Mr. Glenn says on this point, "It would have been strange if he had not [found chromium], since most cloth is chrome-dyed. Had he examined further, equally certain he would have found iron, cellulose, keratin, and some other organic products. Why not assign to one or all of them the maladies of the patients mentioned?" My experience in the examination of cloth for irritants has proved to me that a very large proportion of textile fabrics do not contain chromium in any form whatever, and it therefore never strikes me as remarkably curious in such examinations to find no chromium. In the examination of the specimens in question, no other substance was found which could in any way whatever be considered poisonous. Chromium, then, being the only substance present which is known to act as a poison in certain combinations, was the only substance which could be reasonably suspected. Anybody who has read the original article will, I think, concede that in each case the disturbance was due to something in the cloth. That the conclusion that this something was a compound of chromium was correct, I have very good confirmatory evidence. A young man purchased a cheap pair of trousers, which he wore all summer without drawers, and without perceptible injury. Becoming faded, he had them dyed a dark blue, and shortly after, resuming them under the same conditions as before, he was troubled by an outbreak on the skin of both legs, with irritation and inflammation of a very intense character, particularly on the inner side of the thighs and about the generative organs. Through the courtesy of his physician, I was enabled to make an examination and inquiry, which brought out the fact that the dyer had used bichromate of potassium. The young man had worn the trousers a whole summer without injury, but had suffered intensely from wearing them after they had been dyed with bichromate. Would it, perhaps, be as sensible to ascribe the symptoms to cellulose or keratin?

I cannot see the application of Mr. Glenn's calculation of the loss in weight undergone in a week by a small boy's suit, and of the probable amount inhaled by the wearer, unless he assumes that in the cases reported in my paper the poison was simply inhaled. In these two cases the clothing gave off large amounts of dust, much of which was conveyed to their mouths by wet fingers. Mr. Glenn's figures (that is, that a small boy's suit loses three hundred and forty milligrams in a week) can hardly be taken as a

fixed standard, since the amount of loss will depend much on the particular kind of cloth, and upon the activity and habits of the wearer; and in such calculations it is to be considered that small boys occur in several sizes.

Mr. Glenn's theory of antidotes is in great measure correct, but it must be remembered that many so-called insolubles are soluble in the juices of the body. He goes on to say, "Chromic acid is a very active oxidizer. In contact with organic matter, it is quickly reduced to chromic oxide (a compound insoluble in any of the juices of the animal body). It is a destroyer of organic tissues, therefore. The action of both normal and acid alkali chromates is similar to chromic acid. They destroy organic matter by oxidizing it, chromic oxide being precipitated. . . . When such dust falls upon the mucous membrane, it is quickly reduced by the secretion it finds there, and chromic oxide is precipitated. The membrane is not attacked."

This theory of action is not the one which is held by those who consider chromic acid and chromates true irritant poisons, and as one of the latter persons I am again obliged to dissent. I cannot agree with Mr. Glenn as to the general effect or the local reactions. Wharton and Stillé (*Medical Jurisprudence*, 4th ed. vol. ii.), quoting a case of poisoning by the bichromate of potassium, in which, among other symptoms, suppression of urine occurred, remark, "The suppression of the urine is probably due to inflammation of the kidneys produced by the chromic acid." Falck (*Lehrbuch der practischen Toxikologie*, 1880) quotes a case where violent vomiting and intense abdominal pain occurred soon after the application of chromic acid to a cancerous breast. The patient lay pulseless, with cold skin and cyanotic face, constantly vomiting, to all appearances like a case of Asiatic cholera. Death occurred after several hours. A similar but non-fatal case is reported by Bruck.

These symptoms indicate absorption into the system, and not a mere local oxidation with precipitation of a harmless oxide. The symptoms in most of the reported cases of poisoning by chromic-acid compounds are very similar to the above; and these cases of Mosetig and Bruck are particularly valuable in that the poison was not swallowed, but absorbed from a broken surface.

Speaking of the deaths in Philadelphia following the ingestion of buns colored with chrome yellow, Mr. Glenn remarks, "No one familiar with the oxidizing action of chromic-acid salts, and accustomed to making combustions with lead chromate, would find much difficulty in believing that the small quantity of lead chromate taken by any one victim was reduced while in contact with organic matter in the stomach and intestines, chromic oxide passing out with the dejecta, and lead oxide being left to produce its cumulative effects." Again I cannot agree with him, and I think he would have no difficulty in finding many others who would refuse to believe that the poisonous effects of lead chromate are always due to the lead alone. Schuchardt says in *Maschka's Handbuch*, "Chromate of lead appears to act as a corrosive poison;" and again, "Chromate of lead appears to act more powerfully than the acetate." Wharton and Stillé say, "Although this substance is insoluble in water, and under many circumstances in the stomach and intestinal fluids, sometimes it gives rise to acute poisoning owing to its decomposition after it enters the body. That such a decomposition does occur, and that the chromium may be absorbed, is shown by R. C. Smith (*Brit. Med. Journ.*, 1882, p. 8), who reported a case in which chromic acid was detected in the urine: this was a case of professional poisoning, the patient being employed in weaving yarn colored with chrome-yellow." I will briefly quote another case bearing on this point, reported by Leopold (*Vierteljahrsschrift für gerichtl. Medicin und öffentl. Sanitätswesen*, Band xvii. 29). Four persons engaged some days weaving blankets colored with lead chromate were seized with symptoms of chronic lead-poisoning. During the work the yarn gave off so much dust, that their faces and hair were quite yellow. A two-weeks-old boy was kept in the same room, but was apparently protected by a covering of white woollen cloth. After seven weeks the child became suddenly very sick. Among other symptoms, it had several yellow diarrhœic discharges daily, with restlessness and frequent screaming, during which it dug its hands under the pillows. At first it would drink, but refused food: later on, it drank with some effort, and on the day of its death swallowed with difficulty. The lips were dry, respiration quickened, and death came slowly. On chemical examination after the autopsy, lead chromate was found in the respiratory tract and æsophagus, showing that the cloth had not been a sufficient protection. The rubber nipple which the child had used was found to be free from chromate, most probably because the dust which had adhered to it had been sucked off and swallowed. Among the post-mortem appearances was a perforation of the wall of the stomach. The death of this child was caused by exhaustion following perforation and softening of the stomach, brought on in consequence of swallowing chromate of lead. Neither the symptoms nor the post-mortem appearances could be ascribed to the influence of lead. Part of the chromate in the body was doubtless decomposed, and perforation followed. I agree with Mr. Glenn, that, "if dust from chrome-dyed yarn has any poisonous effects, weavers ought to have some knowledge of it."

Dr. Von Linstow (*Vierteljahrsschrift für gerichtl. Med. u. öffentl. Sanitätswesen*, Band xxi. 60) reports two deaths occurring in boys, aged respectively one and three-quarters and three and one-half years, who together ate six small objects made to represent bees, each piece containing 0.0042 of a centigram of chromate of lead. Both were seized with the same violent symptoms at the same time, a few hours afterward. Among other symptoms may be metioned diarrhœa, convulsions, stupor, great thirst, and difficult deglutition. The younger child died on the second, the elder on the fifth, day after seizure. Among other post-mortem appearances observed in the elder child were destruction of the mucous membrane of the stomach in several places, and ulceration, and perforation of the duodenum. In both cases there was fatty degeneration of the liver. In the younger child there was no perforation, but the mucous membrane of the stomach was marked throughout with red points, and showed velvet-like, opaque swelling. The duodenal mucous membrane was pale, with occasional bloody points. Would anybody think of ascribing these symptoms and post-mortem appearances to lead oxide?

In conclusion, I join Mr. Glenn in the hope that investigation into the subject of chrome-poisoning will not be allowed to die of neglect.

Charles Harrington, M.D.

Chem. Dept. Harv. Med. Sch., Aug. 12.

Poison Fangs and Glands of the Mosquito.

The general arrangement of the mouth of the female mosquito is well described by Dimmock on 'the mouth-parts of the *Diptera*.' The under lip is a large hairy tube, 2 millimetres long, open above, and serving as a sheath for the piercing-apparatus, whilst it is itself terminated by two sensitive labellæ, and by a central lancet-like ligule. Within the structure of the sheath are a large nerve, a pair of longitudinal muscles and many oblique muscles, two large tracheæ by which air can be admitted (so as to distend the organ as in *Musca*), and long filiform tendons which arise at the base of the sheath and support the terminal labellæ.

The piercing-apparatus is enclosed during rest in a strong-pointed upper lip (*labrum*) which is grooved inferiorly for their reception, and which along with them is received into the sheath-like under lip. Within this labrum are the two maxillæ, very sharp and barbed near the tip, and able to play back and forward like saws; also two mandibles, a fine styliform hypopharynx, a delicate sheath for the front segment of the œsophagus, and the œsophagus itself. The last-named organ is received within the head into a strong box-like pharynx, which is well supplied with muscles and is a suction organ. The pharynx draws in blood (and probably vegetable plasm), which it transmits by the long post-pharyngeal part of the œsophagus to the stomach lying in the abdomen of the insect.

The poison-apparatus, which hitherto has been an unknown quantity, is connected with the two mandibles. Each mandible has a large funnel-shaped base, into which is inserted the end of a poison-duct. The thickened axis of the mandible is pierced by a fine canal, which opens just below the sharp apex. The structure reminds one of a bee's sting, saving that it is duplicated. We can by pressure drive out some of the contents and observe them issuing at the sub-terminal orifice. It is probable that when the lancets pierce an object this fang-like mechanism may, by pressing on its base, automatically discharge a portion of the poison. The poison

seems by inflaming the tissues to determine a flow of blood, and also to prevent the coagulation of blood or other proteid. (The blood subsequently coagulates in the mosquito's stomach.)

The poison-duct resembles a trachea in being transversely striated, but differs by the uniform diameter of its tubule of about 6 micromillimetres, by the absence of fine ramifications, and by the great thickness of its wall. The two ducts, proceeding one to each mandible, arise by the bifurcation of a common duct in the region of the neck below the œsophagus. Behind this the difficulty of dissection is considerable, as the parts are so small that they cannot be followed with low microscopic power; they are greatly entangled among the large muscles, tracheæ, and other furniture of the prothorax, and they are easily torn so as to be lost to the search. I have succeeded, however, by working back from the neck, in spreading out the entire system. The common duct arises from three prothoracic glands, all sessile on its lower extremity like the leaves of a trefoil, each supplied with a precurrent ductlet, the three ductlets meeting at a point so as to form the common duct. The glands are each about one-third of a millimeter in length and one-twenty-fifth in diameter. The two lateral glands are of the usual salivary kind common to insects. The central or azygos gland is entirely different, scarcely lobed, but being a mass of brown evenly distributed granules, with oil-like globules intermingled, its ductule having finer walls than in the lateral glands. We may regard this as emphatically the poison-gland, but the intermingled products of all three have their only outlet by the common duct, and thence by its two branches to the mandibles, which therefore play the part of 'poison-fangs.'

Some tentative notes recently given before the American Association involved inaccuracies, which are here rectified and the work completed. Measurements given above are from a small species which may perhaps be identified by its maxillary palps being as long as the maxillæ themselves. They seem to be the same for all the common species. G. MACLOSKIE.

Aug. 20.

Rockwood Meteorite.

ABOUT the middle of March last there was found by Mr. Elihu Humbree, on land owned by Mr. W. B. Lenoir, eight and one-half miles west of Rockwood Furnace, Cumberland county, Tenn., several pieces of what has proved to be a meteorite of very great interest, belonging to the rare class of siderolites, resembling in general appearance the Atacama but differing very widely in the nature of the silicate.

When first found it excited the curiosity of Mr. Humbree, and, after much pounding with an axe, he succeeded in detaching several large pieces and many fragments without finding the large lump of silver in it for which he was looking, the bright specks of nickeliferous iron scattered through the mass having been mistaken by him for that metal.

Three or four weeks later Mr. Lenoir, suspecting the nature of the find, secured the whole of it (with the exception of some small pieces which had been given to friends), and forwarded samples to us for examination. Two or three weeks later, on the 2d of June, I visited Rockwood, and brought the entire find away with me, with the exception of the small pieces already mentioned: these have nearly all been gathered up since and are now in our possession.

The main mass is an irregular ellipsoid, with one side a little flattened, and noticeable by the almost entire absence of the usual pittings, which are present elsewhere on the surface.

The three greatest dimensions are $14\frac{3}{4} \times 10 \times 8\frac{1}{2}$ inches. The weight, which owing to the loss of some of the fragments cannot be determined accurately, was about 83 pounds. Three other smaller masses bring the weight of the entire find to fully 100 pounds (probably two or three pounds more), of which to the present time we have secured $96\frac{1}{2}$ pounds. Specimens have been submitted to Prof. F. W. Clarke of the U. S. National Museum for examination, and very full analyses by Mr. J. E. Whitfield will be published as soon as the work is completed. The analyses thus far made show it to be in the main a silicate of alumina, lime, magnesia, and ferrous oxide, — probably in the form of anosthite and augite, with no olivine. Further analyses are being made to clear up this point. The iron grains contain 12 per cent of nickel, with a trace of copper, and, so far as examination has gone, seem to be distributed through the mass quite evenly; one nodule of iron, however, has been observed which measures three-quarters of an inch in diameter, and exhibits the Widmannstadtian figures very characteristically on the etched surface. Other nodules of iron equally large will probably be met with by further cutting. Although the analysis shows an unusually large amount of chlorine present, decomposition has only affected the surface and in the seams, and has been so little that the original black crust is preserved over a considerable portion of it.

This brings us to the interesting question of how long it could have been exposed to the action of the weather, and it is possible some readers of *Science* can help us to determine that important point.

In the late autumn of 1880, between five and six o'clock in the afternoon, a meteor was seen passing to the north-west over Morgan county, Georgia, which "left a dense trail, not very wide, of light-colored smoke, which could be seen for at least half an hour, and which gradually spread out thin and woolly, like ordinary smoke." A loud report, thought to be about three minutes after the passage of the meteor, was heard by persons who did not see it, as well as by those who were fortunate enough to observe its flight. It would be very interesting if a connection could be traced between this meteor and the meteorite found in Tennessee. If they are the same, it would seem that it should have been seen and heard by different persons all along the line. Any information on this subject will be thankfully received. EDWIN E. HOWELL.

Rochester, N.Y., Aug. 22.

Swill-Milk.

I HAVE read the discussion about 'swill-milk' recently published in *Science* with great interest, especially as I had thought the unhealthiness of distillery-slops as food for animals had been settled and agreed to fifty years ago. Will you permit me to cite an experience of my own bearing on the question? About fifty years ago, — I cannot give the precise date, — I worked in a 'pork-house' one winter, during which I trimmed the hams of five hundred 'still-fed' hogs. It was admitted by all hands that there was not a sound hog in the lot. But few of them were well fatted, although their appearance was good. It was not at all an uncommon thing, in cutting up a hog, to cut through an abscess, varying in size from a cherry to a half-pint; the largest one being in the region of the kidneys. The kidneys and 'tenderloin,' which lies along the vertebra in the region of the kidneys, were invariably infested with kidney-worms, and I have never had any desire to eat tenderloin since.

The testimony of all packers in that section of country — the Miami Valley — was that all still-fed hogs were similarly diseased, though not generally so badly as this lot. The meat was soft and oily, — unfit for barrel-pork.

Some years afterwards, upon my removal to this city, I called upon the butcher of whom I purchased my meat, who was an intelligent man, and asked him if he found the livers of well-fatted cattle in a healthy condition. His answer was no, that it was very rarely that the liver of a well-fatted beef was fit for human food, especially still-fed cattle. They, he asserted, were always diseased; and he added that he never bought still-fed cattle unless they had been taken off slops and fed on corn some weeks before being killed. He asserted that he could distinguish between still-fed and corn-fed beef, after it was slaughtered, by the sight and touch.

JOHN J. JANNEY.

Columbus, O., Aug. 19.

The Pronunciation of 'Arkansas.'

IT is really exasperating to be obliged to explain and apologize every time one pronounces this word correctly in intelligent New England circles, where the later and improper pronunciation was invented and has been established parasitic upon our nomenclature. Had not the Legislature of the State officially declared the final syllable to properly have the sound of *saw*, not *sass*, or had not the inhabitants, from earliest settlements, to say nothing of the people

of Louisiana, of which Arkansas was once a part, always pronounced it *saw*, there would nevertheless be no authority whatever for the curt and abbreviated *sass* which is generally given. The word is an attempt upon the part of the first French missionaries of Marquette's time to phonetically spell in French the name of a tribe of Indians, and no Frenchman would ever pronounce the combination of letters in the manner taught by the New Englanders. The final *s* was and is silent, and the *a* has the nasal *aw* so common in many Frenchmen's speech. As for the old comparativists, who, regardless of the inconsistency of English spelling, always inquire, "if Arkansas is Arkansaw, why is not Kansas, Kansaw," they may be glad to learn that Kansas was Kansaw, and early Anglo-American travellers so pronounced it, and even attempted to spell it phonetically in English, as can be seen in the report of Lieutenant Long's expedition to the Rocky Mountains, 1819–1821, where the word is spelled *Konza* — the nearest combination of English letters that can approach the true French sound.

But Arkansas is not the only French geographic term that has been sacrificed to the attempt of New England lexicographers to create in that region a standard pronunciation of the English. The word *chien*, for instance, which was originally applied to the Indians from their system of police, I believe, and meant literally the 'Dog Indians,' now graces the rivers, counties, cities, and mountains of our maps as Cheyenne, — the most plausible illustration of a Yankee phonetic-pronunciation of a French-spelled word.

'Arkansaw' may be difficult to say, and may fall heavily upon our ears, but it is proper all the same, and the sooner 'Arkansas' is abolished the better for out consistency. ROBT. T. HILL.

U. S. National Museum, Aug. 20.

Diagnosis of a New Species of Thrush (Turdus celænops sp. nov.) from Japan.

Diagnosis. — Back 'mummy-brown' (*Ridgway's Nomenclature of Colors*, pl. iii. Fig. 10); breast and flanks rufous tawny, unspotted; under wing-coverts gray; tail-feathers without white terminal spots; no light stripes about the eyes; second primary shorter than fifth. Adult male with head and neck black. Wing about 120 millimetres.

Type. — United States National Museum, No. 111,665.

Habitat. — 'The Seven Islands,' Idzu, Japan.

During a recent visit to 'The Seven Islands,' south of the Bay of Tokio, Mr. M. Namiye, of the Educational Museum, Tokio, among other interesting species, collected the thrush described above. Although nearest related to *T. chrysolaus*, the male of the new species is easily distinguished from all the forms belonging to the same group by the intensely black color of the head, neck, outer portion of wing, and tail. The female resembles more that of *T. chrysolaus*, but the back is browner, the tawny of the breast and flanks is deeper and more rufous, and the first (tenth, or rudimentary) primary is longer.

I am under great obligations to the authorities of the Tokio Educational Museum for the privilege of describing this interesting novelty. LEONHARD STEJNEGER.

Smithson. Inst., Washington, D.C., Aug. 18.

Audubon's Grave.

THE letter from Mr. D. S. Martin, in *Science* of Aug. 5, interested me very much, as it undoubtedly did every American naturalist; and there is probably no appeal that could be addressed to the naturalists of this country which would meet with a more liberal response than for the means to erect a fitting monument to Audubon.

But this appeal calls up another question in my mind, and, if at this distance I be correctly informed from what I have seen in the press columns, is not the great cathedral, which is to cost some ten millions of money and to be erected in New York City, on such a footing that there seems but little doubt that the structure will eventually be completed? And, further, if I read the words of Bishop Potter aright, is not the edifice when finished to be the 'Westminster Abbey' of the United States? Surely it would seem that the time has arrived when we should be able to point to some grand monument and say, within those walls repose the remains of America's great and honored dead. Such far-reaching projects when perfected ever tend to nationalize us, and to-day, as we are all aware, the ashes of the truly great men, men who have built up America's science, art, letters, and every calling which goes to make a nation great, are in many instances so obscurely rested, that I ween it would test the memory of the best of us to recall the spots where we have placed them.

Why not deposit the remains of our great naturalist, Audubon, in some perfectly secure vault for a few years longer, and then remove them to their final resting place, to their crypt in the great Abbey which is to be built, and then will every naturalist in the United States proudly come forward with his share towards closing the entrance of such a tomb with a fitting monument.

R. W. SHUFELDT.

Fort Wingate, N.Mex., Aug. 12.

Increasing Danger of Tape-Worm.

IN the Texas grazing region, from which has sprung, within the last two decades, the entire stock of range cattle of the western states and territories, the beef tape-worm is a most common occurrence. In fact, I do not believe I exaggerate when I say that at least every fifth person is afflicted. The cause of this is that on open ranges the eggs of tape-worm are most easily and widely distributed, and hence the cattle more frequently become infested with cysts. Stall-fed cattle, on the other hand, where the water is usually less subject to contamination, and the food cleaner, are only seldom infected, and hence tape-worm was not so prevalent in regions where the latter were used.

In the last few years, however, the shipment of range-cattle, by means of refrigerator cars, has become the chief beef supply of the East, and the danger and frequency of tape-worm greatly increased. Of course, no one should stop the use of well-cooked meat on this account, but rare and half-cooked meats can easily be avoided.

R. T. H.

Applied Optics.

WE are indebted to Prof. R. S. Heath of Birmingham, England, for a good book in our language, that at last gives us a theory, the Gaussian, that can be used in the discussion of lenses as we find them in telescopes. Heretofore, so far as I know, English writers have treated the imaginary case of lenses infinitely thin, and in practice have spoken in a vague manner of an optical centre. For a correct theory, one was obliged to recur to the memoir of Gauss, or to some of the German discussions of it.

In Mr. Heath's bibliography of this subject I find no reference to the writings of Biot, to which Mr. G. W. Hill called my attention some time ago. In his 'Astronomie Physique,' Biot devotes 540 pages to optical instruments, and he is so voluminous that it would require some patience to be sure of what he has done. I have the impression that he came near anticipating Gauss. Biot's first volume was published in 1841. Gauss read his memoir in December, 1840, but it was not published until 1843. ASAPH HALL.

Washington, Aug. 20.

Queries.

14. AN EXPULSION OF SPARROWS. — A curious thing happened here a week ago to-day. About four o'clock in the afternoon, a flock of birds — hundreds apparently — flew in circles round and round our house and garden, never settling. This continued for nearly an hour without a sound. Meantime our saucy sparrows disappeared, and have not yet returned. Our trees, which at dawn and twilight resounded with their chattering, are now silent and deserted. I had an opportunity the next morning of seeing closely one of the army of extirpation, — probably a deserter, for he was the only one left. I would describe the bird as about the size of the sparrow, very slender, with full black eye, dark mouse-color, with a light, almost white, breast. This morning for the first time since their expulsion came three or four of our native sparrows, but none of the foreign residents. I am curious to know if this happened any where else. My place being large, I could not see if my neighbors were visited likewise. W. A. G.

New Brighton, S.I., Aug. 18.